ON SCENE

THE NATIONAL MARITIME SAR REVIEW

DEPARTMENT OF TRANSPORTATION

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DISTRESS BROADCAST OR URGENT BROADCAST

Case studies and reports of SAR operations continue to show that the difference between distress broadcasts and urgent broadcasts is not understood. It is often the case that urgent marine information broadcasts (UMIBs) are used when the situation clearly calls for a distress broadcast.

Paragraph 445.1 of the National SAR Manual says, among other things:

> "A distress broadcast should be used when the unit is in the distress phase and it is believed that the distressed unit may not be able to transmit a distress message, or when a distressed unit has sent a distress message which has not been acknowledged by assisting units. An urgent broadcast should be used when the unit is in the alert phase."

If the craft is reported as sunk or capsized, or people are reported in the water, you will want to call on other surface craft nearby to come to their assistance. You should use a distress broadcast because the people need help as fast as they can get it. As a general rule, you should use a distress broadcast whenever there is positive information that a unit is in distress and a broadcast is needed in accordance with the above quoted paragraph from the SAR Manual.

On the other hand, if the distress phase is declared as the result of negative information---continued lack of knowledge of an overdue craft's whereabouts---a distress broadcast would not be wise since it might tie up a radio circuit for a long time. In such an instance, the urgent broadcast started during the uncertainty phase, or alert phase, should be continued but the text should be revised to show that the craft is now considered to be in distress and that listeners should search when passing through areas where the craft might be. This way you can save the distress broadcast for the time when the craft is located and you want to get surface craft there in a hurry.

The proper use of broadcasts is an important part of SAR planning and operations. More times than you might suspect, the broadcast is the element which results in a life saved.

ON SCENE is a SAR publication published by the Commandant, U. S. Coast Guard as a source of information concerning current and proposed procedures as well as new developments in SAR. Articles contained herein are non-record and non-directive.

IS THAT DROWNED PERSON DEAD?

People who have drowned in cold water aren't necessarily dead. Even if they have been under water for half an hour.

This is the conclusion of a study by a University of Michigan lung disease and diving medicine specialist. In a paper presented before the American Lung Association in San Francisco, Dr. Martin J. Nemiroff reported that he has documented intact survival of nine persons who were submerged without oxygen in cold water from 4 to 38 minutes.

PRIMITIVE RESPONSE

The persons who survived were saved by a primitive response which still exists in man to maintain a spark of life which, under the right conditions, can be revived even after many minutes under water.

This finding has important legal and moral implications for physicians and emergency medical workers, Dr. Nemiroff said. In the past, many drowning victims declared dead actually could have had some potential for life, he said.

RESEARCHER'S ADVICE

Dr. Nemiroff's advice to rescue workers and doctors now is:

> "First, don't give up. Even if the victim looks dead. He may be cold, blue, not breathing with no detectable pulse or heartbeat and with fixed and dilated pupils.
>
> "Start resuscitation immediately, external heart massage and ventilation with as near 100 percent oxygen as you have available. Warm the body gradually from the inside by raising the temperature of the oxygen to 110 degrees Fahrenheit with a nebulizer.
>
> "Maintain CPR (Cardio-pulmonary resuscitation) at least until the body temperature reaches normal. Defibrillation--shocking the heart into action may not be successful until normal body temperature is reached."

THE DIVING REFLEX

Dr. Nemiroff said he selected 13 cases considered to be true "cold water drownings" -- those in water below 70 degrees Fahrenheit. Of the 13 near-drownings, nine were successfully resuscitated without brain damage or other ill effects.

What saved the survivors, Dr. Nemiroff said, was the activitation, after the face is submerged in cold water, of a little known automatic response in mammals, called the "mammalian diving reflex", as well as the coldness of the water.

First identified in the 1930's in whales, seals and porpoises, the reflex allows these sea-going mammals to exist and function under water, without breathing, for up to 30 minutes in an emergency. The automatic reflex greatly reduces the blood supply to the skin, muscles and gut -- tissues which are resistant to oxygen-loss damage, and reserves the remaining blood oxygen for the vital brain. Cold water also reduces the oxygen need of tissues, further lengthening survival time without external oxygen, Dr. Nemiroff added.

Although man quickly becomes unconscious after involuntary submersion, the diving reflex still functions in cold water, allowing the heart to maintain a feeble, but constant supply of blood to the brain extending possible survival in very cold water perhaps up to one hour, Dr. Nemiroff said.

CASE HISTORIES

The record so far in his study is held by an 18-year-old Jackson, Mich., college student who, in late March, 1975 was trapped in his car and submerged in a frozen pond for 38 minutes.

"The car rolled over after breaking through the ice, eliminating the possibility of an air bubble," Dr. Nemiroff said. "The patient recalled struggling, inhaling water and losing consciousness."

When he and a companion were brought to the surface, both had no life signs and were declared dead at the scene. When they were being loaded into an ambulance to be taken to the morgue, the student's body gave an agonal gasp--a sort of involuntary belch often associated with death--and resuscitation on him was started immediately.

After a high speed ambulance run to University of Michigan Hospital, two hours of resuscitation and 13 hours of respiratory support, the student regained consciousness and recognized his mother. Two weeks later he left the hospital to return to college where he is an A- student. His companion in the car, whose body made no sounds was not resuscitated, died.

Another survivor in the Nemiroff series was a physician who "drowned" in a lake near Ann Arbor, but was resuscitated in a hospital after 15 minutes of submersion. As with the college student he had no mental impairment and has resumed his practice.

"These two cases illustrate," Dr. Nemiroff said, "that the 'Karen Ann Quinlan syndrome' is not the inevitable consequence of oxygen deprivation--under cold water conditions." Duration under water, the temperature of the water, age of victim (the mammalian reflex is more pronounced in children) and prompt resuscitation efforts are the key elements to intact survival.

IMPORTANT CONCLUSIONS

Another, similar study of drownings and near-drownings in Florida water over 70 Fahrenheit showed that, above this temperature, four minutes submersion appears to be the cutoff point for brain damage and/or survival, Nemiroff said.

However in Michigan and many other states near large bodies of water, the year-round temperature, especially in deeper areas, is well below 70 degrees. The protective effect of the diving reflex also is lost, he cautioned, as soon as the victim is removed from the water and resuscitation must start immediately at the water's edge.

The University of Michigan physician also advises doctors to "Be prepared for resistance from relatives."

Dr. Nemiroff noted that, to his surprise, many relatives were opposed to CPR or even demanded that the doctor stop revival efforts. "There appears to be a lot of guilt associated with drownings and relatives tend to feel 'It's no use' or that you are somehow 'desecrating the body' or that you may 'bring back a vegetable'," the physician said.

"In several of these (13) cases, we had relatives who were furious with us for extending resuscitation, only later to see their 'dead' loved one make a full recovery," he said.

"Follow your own judgement. Be absolutely certain the patient is dead, before you give up," he urged.

We're All in the Same Boat!
Suggestion Savings Benefit Everyone

SHARK UPDATE

The Navy has recently terminated the procurement of "Shark Chaser". Research indicates that the chemicals used in the past as "Shark Repellents" including "Shark Chaser" do not in fact have any repellent effect on sharks.

Recently research workers have discovered that sharks possess some very unusual sensory abilities such as low frequency sound and electric-field sensing. Low frequency sound has very readily attracted some species of sharks. They will approach, locate, and attack an underwater speaker emitting such noise. Attractive noises are in the frequency range of helicopter blade sounds, and the implication is obvious: In rescue operations, the appropriate technique is to get to the victim and get him out of the water as soon as possible, and minimize the possibility of attracting sharks toward him. Do not hover over the person longer than is necessary.

Many species of sharks are originally attracted to potential food items by odor. They encounter the odor trailing downstream, turn upstream, and follow the trail into the near vicinity of the object. However. the final decision on "What to bite" is not made on the basis of odor; that decision is made on the basis of an ability which sharks possess to very accurately sense electric fields and their sources. The electrical fields generated by an organism's nervous functioning are a much more precise locator than odor when the shark is in close proximity to the prey.

There are a few potential candidate chemicals for repellents available, and some low level of funding is going into such research (especially a peculiar flatfish from the Red Sea). In view of past failure to find effective chemical repellents, and in light of the next paragraph, little effort will be expended in any attempt to locate, identify, test, or make available such a material.

A device now exists which offers a combination of advantages in protecting a victim from potential attack. This is the "JOHNSON SHARK BAG"; it consists of a large, dark plastic bag with an inflatable collar around the top. One inflates the collar, then gets into the bag. The bag slows or prevents development of an odor trail, eliminates visual clues (all the shark sees is a shapeless, uninteresting black mass without movement or recognizable outlines), and also acts as an electric field insulator. The bag is extremely small when packaged, readily replacing the packet of useless Shark Chaser. What this device amounts to is an "almost a raft"; a good one-man or multi-place liferaft would have all the same advantages, plus flotation/support.

GENERAL ADVICE

1. Never swim or dive alone.

2. Most dangerous sharks feed at night, so never swim or dive at night or in turbid water unless absolutely necessary.

3. If you are injured and bleeding, leave the water as soon as possible. In the case of air and sea disasters, put wounded people in rafts if possible.

4. Survivors at sea should not remove shoes or clothing. They will help protect you from the shark's skin. Sharks have a rough skin resembling sandpaper and often rub objects floating in the water.

5. Divers threatened by sharks should keep the shark in sight if possible and fend off attacks with a "shark billy" or any available stick, spear gun, etc. until safety can be reached. If you have nothing else, use your gloved hands or flippered feet.

6. All sharks are potentially dangerous; never provoke a shark by pulling its tail or otherwise molesting it.

7. Never swim where trash or garbage is dumped. Such areas are almost always frequented by sharks.

Contd...on page 7

WHEN TO SEARCH FOR AN OVERDUE BOAT

Some recent cases involving overdue small boats have reflected poorly on the Coast Guard when viewed with 20/20 hind sight. Looking at all of these cases together shows a pattern which should be called to the attention of all SAR personnel.

Consistently, the criticism which has been leveled is that the search was not started soon enough. The pattern which seems to run through these cases is that initial search effort was held off pending completion of communication checks. There may be a problem here of trying to do everything by the numbers, consequently putting headwork and good judgement on ice. This would not be surprising, given the current mania for trying to quantify everything.

Although the National SAR Manual tries to prescribe general rules for SAR actions, the attempt was made to leave room for the use of mind over matter. A general statement to this effect is contained in the letter of promulgation: ".... because of the many variables encountered in SAR operations, these procedures and techniques should be tempered with judgement, having due regard for conditions existing at the time which may require deviation and resourcefulness". Another significant statement more to the point is made in paragraph 782 - Actions During the Alert Phase - which should be pondered: "If the degree of apprehension warrants, take the necessary action to dispatch alert facilities on a route search". It is particularly important to make this kind of a judgement in cases of overdue small craft, since these are the ones most likely to be in serious trouble if they are in any trouble at all.

No hard and fast rules can be laid down on when to start searching for an overdue surface craft on which no positive indication of distress has been received. In general however, for small craft, some search action should be initiated when circumstances cause sufficient apprehension for the safety of the craft to register a probability that it is in some kind of trouble. Such action may be a route search, an initial check of a reported fishing area, a search along the line of probable drift, a check of alternate routes, etc. If no clues are received from the initial search efforts and communications check, this initial effort can then be built into a full search.

There is another type of overdue case which comes to mind; the one where all the evidence creates a strong suspicion that a serious distress exists. Such a case might be one where some children are reported out in a rowboat, overdue and bad weather is on the way. Without positive search action quickly this situation could fast deteriorate into a disaster. Awaiting the completion of even a preliminary communications check in this case could cost some lives. Unless there is some mitigating circumstances which dictates otherwise, immediate full search effort is warranted.

Here are some circumstances which can indicate that there is a probability that the craft is in some trouble (experienced SAR personnel can think of others):

a. Inexperienced operator;

b. Bad weather conditions have been experienced or are forecast;

c. There are known defects in the boat;

d. There is a past record of troubles with the boat or operator;

e. There are known unusual dangers in the boat's area of operations;

f. A preliminary communications check verifies departure and non-arrival and there is no clue that the boat is safe;

g. A demonstrated intent by the operator to adhere to his itinerary and to check in; such as phone calls from intermediate stops, followed by an excessive period of no contact.

The above list is certainly not

all-inclusive, RCC personnel can prepare their own lists of circumstances which, from experience, have pointed to the probability that the overdue boat is in trouble.

Another kind of circumstance which calls for initiation of search sooner than normal is what might be called a circumstance of opportunity---only a few hours of daylight are left which should be taken advantage of, or you have a search unit readily available, on patrol, or already searching for something else in the same area. Such opportunities should be used and not be allowed to slip by while you are waiting for the completion of communication checks.

An associated point is the question of night search. The traditional "first light search" approach may be justified when the distance to, and size of, the search area are such that you can't afford to commit the necessary resources for a low probability search. However, in most small boat cases the area is relatively small and usually not too far from home, so it is possible to search at night and, if necessary, search again during the day. Our night illumination capability is improving, and we should use all our capability. Lack of knowledge of night signalling devices on the overdue boat is a minor consideration. If an operator hears or sees a search craft, the chances are pretty good that he'll find something to signal with. At any rate it gives him more incentive to stay alive. He at least knows we're trying -- and when you're cold and wet and tired, this can mean a lot.

SHARK UPDATE **Contd from page 5**

8. Never spear fish in areas frequented by sharks.

EMERGENCY TREATMENT

Shark-attack victims usually die from a combination of shock and blood loss. Therefore, the following things should be done:

1. Remove the victim from the water as quickly as possible and place him head-downward on the beach slope to combat shock by increasing blood flow to the head.

2. Bleeding should be controlled as quickly as possible by manually pressing on pressure points or applying tourniquets. If possible, efforts to stop bleeding should start while the victim is still in the water.

3. A doctor, corpsman or hospital should be notified as soon as possible. If possible, blood pressure and pulse rate should be taken and recorded for future reference by a physician.

4. The victim should not be given warm drinks or alcohol, only sips of fresh water. In warm climates, cover victim lightly with a towel or other light covering and keep cool. Victims are usually warm and exhausted from struggling to shore.

5. Aid should be brought to the victim rather than taking the victim to the aid. This is because movement can increase shock. The victim should not be moved unless he has recovered from shock and a doctor is present. He is better off left alone than moved unwisely.

6. Lay people should refrain from trying to help the victim in any way other than those steps outlined above; much more harm than good can come of well-meant but incorrect attempts to render aid. Experts consider this to be one of the most important factors in determining the victim's survival.

Do you have questions concerning SAR? If so...

"ASK ALBERT"

Do you have a question concerning SAR? If so, then "Ask Albert." This is a SAR question and answer column, prepared by the staff of the National Search and Rescue School. If you have a question concerning SAR procedures, techniques, operations, organization, or administration, then address your question to: ALBERT ALBATROSS, National Search and Rescue School, Governors Island, New York, N.Y. 10004

QUESTION: What is the difference between probability of detection and the quantity "Search Effectiveness" as used in the CASP system?

ANSWER: POD and Cumulative POD are probabilities of detection, but with one giant assumption. They both assume that the target was <u>in</u> the search area. So, for example, 78% POD really says that "probability of detection is 78%, <u>if the target is in the search area</u>". But let's be honest - there is no guarantee that the target is in the area we pick to search.

In the past (before CASP) we didn't have a good handle on how likely the target was to be in, or out, of the search area. But since the CASP MAP shows the probability of being <u>anywhere</u> in the distribution, we now have that critical number. Hence, the "new" terms: P(success) and Search Effectiveness Percent (SEP)

P(success) is similar to POD, except that it does not have that big assumption. It is the "real" probability of locating a target on a particular search. In numbers,

$$P(\text{success}) = POD \times Prob(\text{target is in search area})$$

Search Effectiveness Percent is "cumulative P (success)", or the probability of finding the target, given all the searching that has been done so far. In numbers, say, for the 5th search,

$$SEP_{5th} = SEP_{4th} + P(\text{success})_{5th} \times Prob(\text{no detection in first 4 searches})$$

So, P(success) and SEP are related to each other the same way POD and cumulative POD are related, but <u>without</u> the assumption of the target being in the search area.

The Liferaft

General Remarks---Exposure Problems

Exposure results in a general deterioration and if prolonged has very serious consequences, particularly at extremes of temperature, when FOOD and WATER RATIONS are inadequate and MORALE is low.

HYPOTHERMIA, IMMERSION FOOT and similar disabilities occur under cold, wet conditions; DEHYDRATION and SUNBURN under hot conditions. The diurnal alternation of heat by day and cold by night is particularly exhausting.

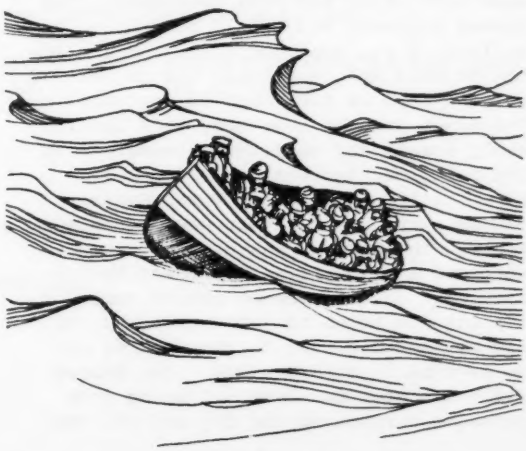
Survivors should take as much clothing as possible with them when abandoning ship and make use of boats' covers, sails etc., to give protection against cold, wind, sun, rain and spray.

Wrecked Fishing Boat --- North Atlantic

A Bahamian fisherman rode the cabin top of his wrecked boat for two days. By standing up to keep out of the cold water he survived, his companion died within a few hours after the boat sunk.

Lifeboat --- North Atlantic

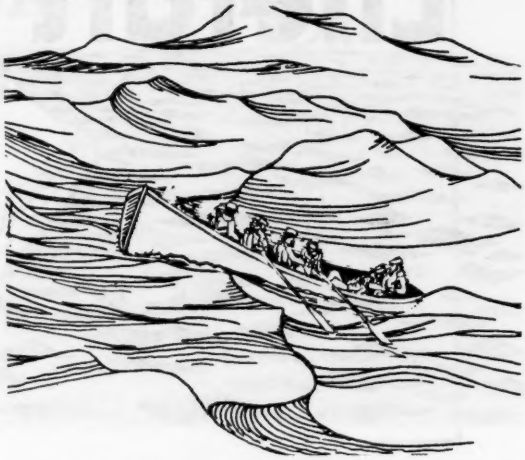
There were twelve of us holding on to this boat and the swell was continually breaking over us. The temperature was below zero and I only had on a suit of pyjamas and a raincoat, but most of the others had on heavy clothes and boots. After a struggle we managed to right the boat, and we all got into it, but we could not bale it out, as the the seas washed over the gunwale faster than we could bale. The boat's provisions and gear had been washed out of the boat when it capsized and we had no food or water left.



The sea water was warmer than the air, and by keeping our bodies submerged in the water in the boat we avoided being frozen. A young wireless operator aged about 17 was the first to die on the boat from exposure after about half an hour. From then onwards the Captain, second and third Officers, four sailors, the Bosun and second Wireless Operator all died from exposure at varying intervals. The Captain (38) and the two officers were all young and strong men and well clothed and I do not understand why they were unable to stand the ordeal as well as I did. After being in the boat for about ten hours I began to feel very drowsy and it was a great effort to keep myself awake. The Chief Wireless Officer also became very drowsy and I had great difficulty in keeping him awake. The Senior Wireless Officer and myself were the only two survivors in our boat. We were picked up at about 1500 (after being adrift for twelve hours)... I was kept in hospital for seven weeks.

Lifeboat --- North Atlantic

Sixth day, "The crew were by this time showing signs of exhaustion and at about 1500 a native cook died from exposure. Bad weather-conditions continued through that day and after midnight I noticed that several of the crew showed signs of exhaustion, they became delirious and started talking nonsense." "At 0100 the Second Steward died from exposure. I tried artificial respiration on him but he did not respond. At 0300 the Greaser, who was already delirious, drank some salt water and fell overboard. The Second Engineer and myself hung on to him as long as our weakened state could allow but he died and we finally had to let him go. At 0600 an A.B. died of exposure. These men died because they were continually soaked and suffered intensely from the cold, the temperature being below 60°. At 1000 the Junior Third Engineer passed away. The weather now moderated. At 1200 the Second Cook died from exposure and at 1400 he was followed by another. An Able Seaman became very violent and tried to jump overboard; we had to lash him down to the thwarts but he eventually died at 1700. The Second Radio Operator had been suffering from exposure throughout the day and was now in a weak state. At 1740 a homeward-bound ship was sighted... we made strenuous efforts to bring round the Radio Operator and we told him a rescue vessel was in sight but it did not register and he died at 1750. Shortly afterwards we were picked up by this vessel.



Fourteen men including myself were rescued from my boat, nine in all having died in the boat. I am of the opinion that these men died chiefly from exposure. We had a yellow hood forward in the boat and a dodger round the boat but we could not keep the latter rigged all the time because of the bad weather. The men were wet through and shivering from the cold all the time. Only six men had their protective suits, and although their clothes were wet underneath, these men survived the ordeal. The men who died all became apathetic and their morale became very low. I could not get them to move in an emergency or do anything to help themselves. They complained continually of thirst but I could not spare them any more water. I considered that the allowance (one dipper at morning, another at night) was generous, considering the amount I had altogether. Lack of sleep, too was a contributory factor; I had only about two hours' sleep throught the trip, and when I was picked up I felt I could not have survived another day's exposure to the elements".

Inflatable Raft --- Bay of Bengal

Eighth day. Lieutenant Ba Thaw reported "...there were seventeen of us still

on the raft (the eighteenth man had committed suicide). But five of the men were very sick. They had bad sores. They were too weak to speak. They could not raise their arms or legs. They could manage their sweets. The water ration we poured down their throats. They were like skeletons. Some of them tried to speak to me but they could only croak and rattle".

Raft --- Indian Ocean

Twentieth day. Ensio Tiira reported "I was skin and bones and festering sores from the soles of my feet to as much of my body as I could see. Underneath my half-inch stubble of whiskers the skin was flaking off and sore to the touch. My nose and ears were burnt raw".

Thirty second day, on being rescued, "They cut away my clothes and my flesh came, too, in long straight pieces".

Lifeboat --- Indian Ocean

Twenty second day. Captain Foster logged "Very rough sea and heavy squalls. All hands catching rainwater. Our clothes could not be more wet. Hope we have some relief from this soon". "The cold, more than anything, is taking the heart out of the men".

Yacht's Dinghy --- South Atlantic

A twenty four day ordeal. By day, the survivors were burned by the fierce heat of the sun beating down on their heads and bare bodies, while at night they were chilled and numbed. This alternating torture of heat and cold did more than anything to lower their morale; only in the first hour or two after dawn and the last hour before sunset were they every really comfortable.

Ship's Boat --- South Pacific

44th day, Captain Bligh reported "In the morning, after a very comfortless night, there was a visible alteration for the worse in many of the people; which gave me great apprehensions. An extreme weakness, swelled legs, hollow and ghastly countenance, a more than common inclination to sleep, with an apparent debility of understanding, seemed to me the melacholy presages of an approaching dissolution". 47th day, "Our bodies were nothing but skin and bones, our limbs were full of sores and we were clothed in rags; in this condition, with the tears of joy and gratitude flowing down our cheeks the people of Timor beheld us with a mixture of horror, surprise and pity".

Editor's Note: *The text in this article is reprinted with permission from International Radio-Medical Centre (CIRM) study Exposure at Sea.*

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